

U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE  
CALIFORNIA FOREST AND RANGE EXPERIMENT STATION  
Division of Forest Insect Research

MOUNTAIN PINE BEETLE CONDITIONS  
DINGLEY AND DELANEY CREEKS  
YOSEMITE NATIONAL PARK

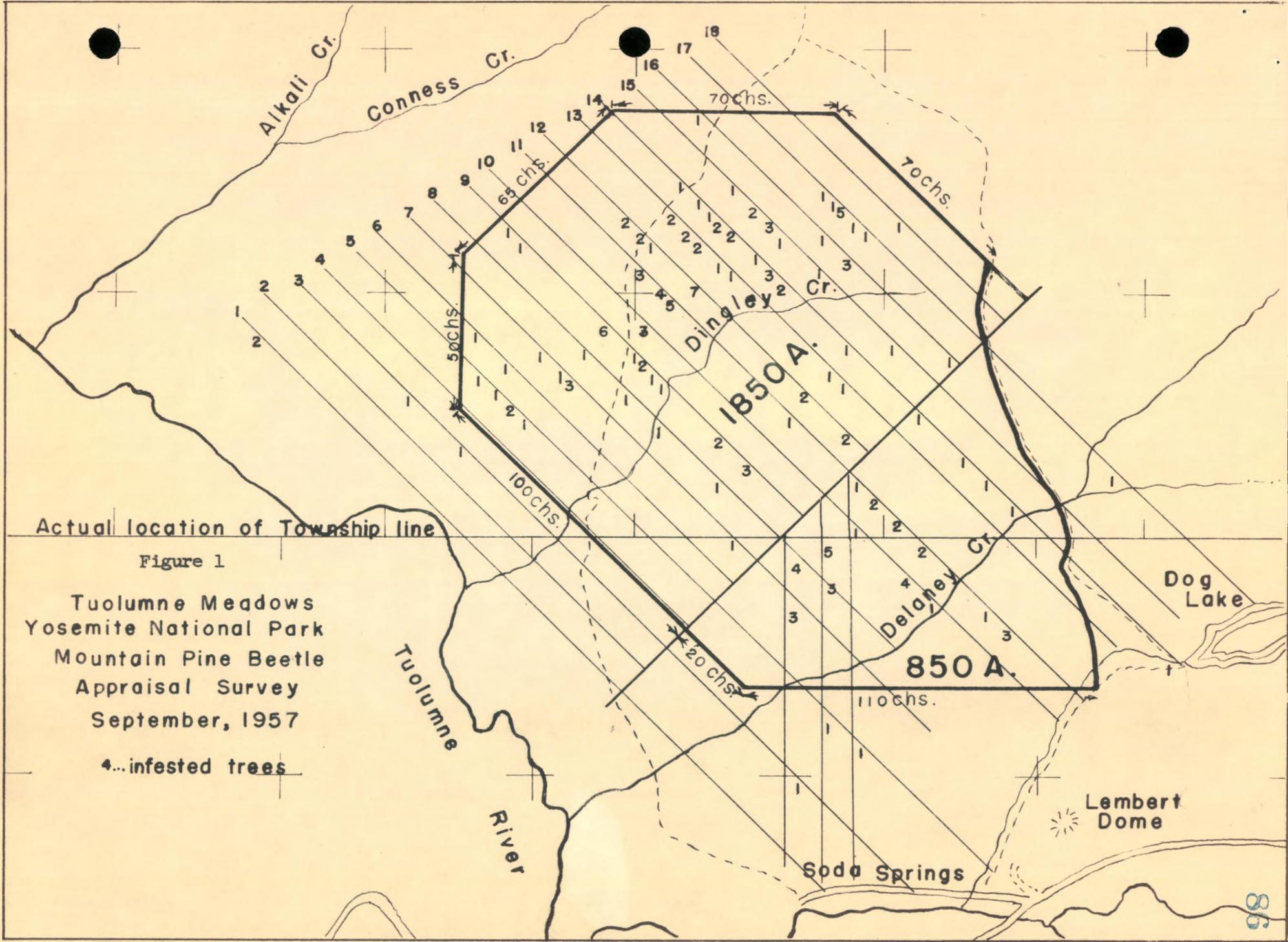
INTRODUCTION

The mountain pine beetle, Dendroctonus monticolae Hopk., in association with the lodgepole needle miner, Recurvaria milleri Busck, is causing increasing losses of lodgepole pine in the two drainages just north of Tuolumne Meadows, Yosemite National Park. The drainages are Dingley Creek and Delaney Creek. During the first half of September 1957, an appraisal survey was made to assess the bark beetle damage in these drainages.

Since about 1911, mountain pine beetle epidemics in the northeastern part of the Park have followed the heavy defoliation by the lodgepole needle miner. This defoliation in 1957 was worse than it has been in the last 30 years.

The current epidemic of the mountain pine beetle in lodgepole in the Park started about 1952 in the Conness and Alkali Creek drainages, about ten miles north of the present Dingley-Delaney infestation (Hall and Wickman, 1953). Control was attempted in the Conness basin during June and July 1954, but this failed to prevent the infestation from increasing. (Downing, 1954b). By the fall of 1955, the infestation had expanded from an original center of about 500 acres with 2,050 infested trees in 1953 to 5,400 acres and 48,060 infested trees in 1955. (Stevens and Hall, 1955). By that time a small center of infestation was found in the Dingley Creek drainage where it was estimated that there were 120 infested trees on about 500 acres. That year the Conness and Alkali area previously infested was surrendered to the beetles, and a new area of combat was established in Dingley and Delaney Creeks. Dingley Creek, a small tributary at the headwaters of the Tuolumne River, is the drainage bordering the old outbreak. Delaney Creek, just south of Dingley, is the only other drainage between the "ghost forests" of older infestation and the Tuolumne Meadows recreation area (figure 1).

A control operation was conducted in Dingley Creek during the spring of 1956 and the 120 trees treated. In August, after the next generation of bark beetles had made their attacks, Struble and Trostle found on a reconnaissance of the area that the infestation was continuing. The area was respotted in the fall of 1956, and about half of the trees treated. In the spring of 1957 the control was completed and by July a total of 297 trees had been treated.



The aim of control within these two drainages has not been to reduce the entire mountain pine beetle population in the Park, but to prevent the advance of the epidemic and protect the forest cover in and around Tuolumne Meadows until the needle-miner problem can be solved.

In 1957 an appraisal of the mountain pine beetle conditions in both Dingley and Delaney (Trostle, 1957) Creeks was made during the period of September 3 to 13. This survey had two objectives: (1) To obtain a sample of the current infestation from which to make an estimate of the number of infested trees containing over-wintering broods; (2) to test the accuracy and time required by two different sampling techniques - plots and strips. This report is concerned with reporting only on the first phase of this survey. Another report will be prepared to cover the second objective. This appraisal was conducted by the Division of Forest Insect Research, California Forest and Range Experiment Station. Crew members were: R.C. Hall, R.E. Stevens, G.C. Trostle, J.W. Batchelder, P.H. Lord and W.J. Hogg.

#### Insect and Host Species

The host trees are mature lodgepole pine growing in an almost pure stand. For the past 5 years these stands have been severely defoliated by the lodgepole needle miner. Now the mountain pine beetle is attacking and killing an increasing number of these defoliated trees. The bark beetle broods produced appeared to be numerous and healthy. At the time of this September survey most of the broods were in the larval stage, although some new attacks were found. In a few trees, particularly in the lower diameters, broods were scattered and small. A few trees were located which appeared to have died from defoliation alone.

#### Survey Method

The Dingley and Delaney drainages were separated by running a base line from the Youngs Lake trail north  $45^{\circ}$  east through the north corner of sections 4 and 5. Starting points were marked along the base line at 10-chain intervals (figure 1). Cruise lines were then run from these points across the drainage at  $90^{\circ}$  to the base line. In Dingley Creek, infested trees were sampled by counting the number which occurred on  $\frac{1}{4}$ -acre sample plots. These plots were taken at  $2\frac{1}{2}$ -chain intervals along the 18 cruise lines.

Delaney Creek was sampled with both  $\frac{1}{4}$ -acre plots every  $2\frac{1}{2}$  chains and 1-chain wide continuous sample strips. Both of these cruise methods give the same acreage of sample for a given distance. Eleven cruise lines were run across the drainage on a bearing of  $S45^{\circ}E$ . The other three lines were run on a north or south bearing.

#### Status of the Infestation

The mountain pine beetle infestation has increased considerably in area over 1956. Previously, only a few scattered trees were found in Delaney Creek; now the infestation covers most of the area north of the creek.

The infestation in the Dingley drainage, although still concentrated in the 600-acre area of past control, has spread to both the west and south.

A total of 4,400 acres were surveyed with about 500 acres of sample. By plotting the location of infested trees (figure 1), the total area of infestation in both drainages can be reduced to 2,700. A summary of the data obtained from sampling within this 2,700-acre area is shown in table 1. This area contains an estimated 1,027 to 1,477 infested trees ranging from 6 to 56 inches in diameter breast high, with an average diameter of 24 inches. About 37 percent of these trees are in the 24, 26, and 28-inch diameter classes.

Table 1.--Number of mountain pine beetle-infested trees in the  
Dingley and Delaney Creek drainages, as shown by the  
September 1957 survey

Drainage	Cruise : lines	Acres : sampled	Infested trees in sample	Trees per acre	Total Acres	Trees
Dingley	20	238.0	114	0.479 ± .053	1,850	886
Delaney	11	83.5	36	0.431 ± .127	850	366
Total	31	321.5	150		2,700	1,252

#### Control Possibilities

Past history has shown that the mountain pine beetle will continue to increase rapidly in needle miner-infested lodgepole until most all of the mature trees are killed. It would not be unreasonable to assume that if the current generation is allowed to emerge and attack during 1958 the number of infested trees would at least double.

Artificial control can be obtained by burning infested trees or treating infested bark with chemical sprays. A control operation of this area might be organized as follows:

1. Outline the control area with heavy string hung high to prevent breaking.
2. String parallel lines within the control area beginning from a base line. Each lane, delineated by these string lines, should be not over 3 chains wide (198 feet); two chains wide would probably be preferable. String lines should have stations tagged at 5-chain intervals to aid the spotters in mapping. At an average rate of 6 miles per day, 19 man-days would be required to string the area every 3 chains.

3. Infested trees should be marked, tagged, or both, and mapped. Where control work is done by contract, tags can be retained by the treater to show proof of treatment. A map is kept by the spotter to show the location of each tree. Orientation can be maintained by the 5-chain station tags on the string lines. A spotter should average about 160 acres covered and 100 trees marked per day. At this rate, about 17 man-days will be required for spotting.

4. Treating crews, of a minimum of 3 men, can follow a day or more behind the spotters. By working from the spotter's map they can save a great deal of travel from one tree to another.

5. Infested trees may be treated either by burning or chemical sprays. If burning is used, all infested bark should be burned off the logs. If chemical spray is used, the procedures recommended in publications by Downing (1954a) and Stevens (1957) should be followed with one exception. This exception involves a recent change in ethylene dibromide formulation. Instead of the emulsifiers previously recommended, Triton X-151 and Triton X-171 should be used. In addition, mixing should be done in the exact order and proportions given below. The formulation is as follows:

3 gallons of diesel oil  
3 quarts of emulsifier made from 1 pint Triton X-151 and 5 pints Triton X-171  
5 quarts ethylene dibromide (85 percent)  
20 gallons water  
25 gallons mixed spray

All infested trees should be treated before the overwintering broods reach maturity. Brood maturity and emergence can be expected to occur about July 1 in these 2 drainages.

Berkeley, California  
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